

1993 Nobel Prize in Physics

Joseph H. Taylor Jr. and Russell A. Hulse



Discovery

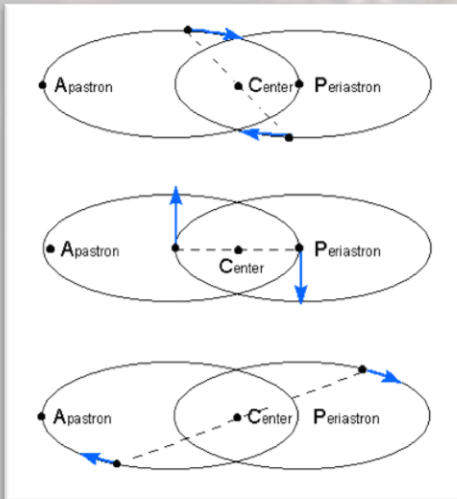
Detected radio waves indicative of pulsar (1974)

- Hulse-Taylor Pulsar of PSR 1913+16

Pulse period of 59 milliseconds

- Orbital period varied repetitively over period of 7.75 hours

Indicated pulsar must be in binary orbit with another star



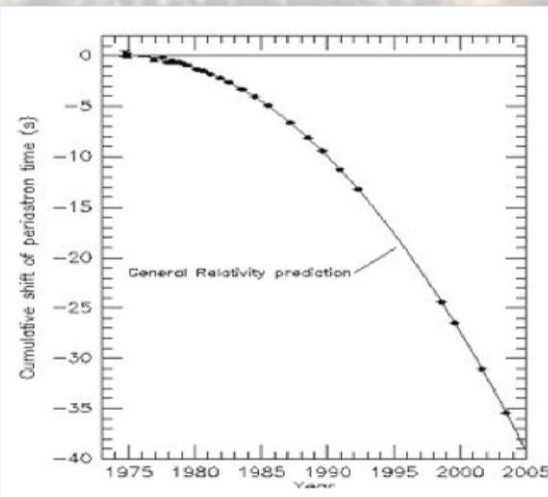
*Orbit of
a Binary
Pulsar*

Evidence of Gravitational Waves

Gravitational waves predicted by Einstein's general theory of relativity (difficult to observe)

The orbit of PSR 1913+16 decayed due to energy loss

- Orbital period decreased by more than one second by 1982
- Forty seconds shorter by 2005
- The binary star system will collide in approximately 300 million years



Energy loss agrees precisely with predictions of gravitational waves described by general

*Orbital
Period
Decline*